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**DIVISION 13**

**Section Title**

13050	Double Walled Methanol Storage Tank
13825	Air Dispersion Stack

## **DOUBLE WALLED METHANOL STORAGE TANK**

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### **1. GENERAL**

#### **1.1 Work Included**

- .1 Supply and supervision of installation, testing and commissioning of double walled storage tanks, complete with all fittings and appurtenances, designed for methanol storage.

#### **1.2 Submittals**

- .1 Submit Shop Drawings in accordance with Section 01300 and Section 11005.
- .2 Operation and Maintenance Data: provide for incorporation in O&M Manual as specified in Section 01735. Include complete description of operation together with general arrangement and detailed drawings, wiring diagrams for power and control schematics, parts catalogue with complete list of repair and replacement parts with Section Drawings illustrating the connections and identifying numbers.

#### **1.3 Coordination**

- .1 Coordinate with other Divisions to ensure there are no conflicts in the Work.

#### **1.4 Shipment, Protection, and Storage**

- .1 Ship pre-assembled to the degree possible.
- .2 Provide storage instructions indicating specific requirements to ensure there is no uneven wear, distortion or weathering of components.
- .3 Identify all other special storage requirements.

### **2. PRODUCTS**

#### **2.1 Tank**

- .1 Tank shall be a Westeel Model FV-500TK (50,000 L) horizontal "Fuel-Vault"
- .2 The tank shall be ULC-listed as a "Contained Aboveground Tank Assembly for Flammable and Combustible Liquids". A ULC-S653 label shall be affixed to the tank.
- .3 The primary tank shall be constructed in compliance with ULC-S601 and shall be provided with wear plates under the fill and gauge stick openings.
- .4 The containment tank shall be a steel shell covering 320 degrees of the primary tank circumference and shall be seal welded to the primary tank. The length of the containment tank shall be extended beyond the end of the primary tank to provide 110 percent capacity of the primary tank.

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- .5 The tank assembly shall provide provision for the inspection of the contained space and the removal of any liquid that may accumulate.
- .6 The tank shall be provided with oversize welded-on steel support saddles, designed to have a foundation bearing less than or equal to 120 kPa.
- .7 Tank shall be provided with an overfill protection device meeting the requirements of ULC/ORD-C58.15 installed in the fill pipe and adjusted to stop the flow of fuel when 95 percent of the tank capacity is reached. Device shall be Clay and Bailey 95 percent F-35 Fill Limiter 3-inch bottom in-load system kit including aluminum drop-tube.
- .8 Tanks shall be provided with a 25 L spill box, which meets the requirements of ULC/ORD-C142.19 and provides catchment for spilled product at the time of filling. The spill box shall provide a means to drain any spilled product into the primary tank.
- .9 Provide pressure and vacuum relief vent. Vent shall be sized for the pressures and flows specified on the Drawings.
- .10 Provide emergency vent, as specified on the Drawings.
- .11 Provide gauge dipstick opening kit.

### **2.2 Fittings**

- .1 As a minimum, provide the following fittings
  - .1 100 mm NPT fill
  - .2 32 mm NPT gauge stick opening
  - .3 100 mm NPT top outlet
  - .4 50 mm water draw-off complete with 38 mm pipe to within 13 mm of the tank bottom
  - .5 100 mm NPT spare
  - .6 75 mm NPT spare
  - .7 Emergency and normal venting for primary tank
  - .8 50 mm NPT containment inspection
  - .9 Secondary containment emergency vent

### **2.3 Painting**

- .1 All exterior surfaces shall be commercially sandblasted and primed with epoxy primer and top-coated with high gloss white 5:1 urethane paint.

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**3. EXECUTION**

**3.1 Manufacturer's Representative**

- .1 To ensure the equipment is installed, operated, and maintained in accordance with the manufacturer's recommended procedures, arrange for a technically qualified manufacturer's representative to witness the installation work, certify correct installation, train operating and maintenance staff, and undertake system testing.

**3.2 Installation**

- .1 Ensure the equipment is installed as required to provide satisfactory service.
- .2 Instruct installer in the methods and precautions to be followed in the installation of the equipment. Certify the installer's understanding by completing Form 101, included in Section 01650.
- .3 Cooperate with the installer to fulfill the requirements for a successful installation by completing Form 102, included in Section 01650.
- .4 In-load system shall be factory installed
- .5 Tanks shall be installed by a Licensed Petroleum Technician recognized by Manitoba Conservation.

**3.3 Testing**

- .1 Ensure the equipment, including all component parts, operates as intended.
- .2 Cooperate with the installer to fulfill the requirements for successful testing of the equipment by completing Form 103, included in Section 01650.

**3.4 Commissioning**

- .1 Attend during commissioning of the process system which includes the equipment specified in this Section and to ensure the equipment functions as intended in the process system.

**END OF SECTION**

## AIR DISPERSION STACK

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### **1. GENERAL**

#### **1.1 Work Included**

- .1 Design, fabrication, supply, and supervision of installation, testing and commissioning of dual wall air dispersion stack.

#### **1.2 Submittals**

- .1 Submit Shop Drawings in accordance with Section 01300 and Section 11005 including:
  - .1 Design calculations defining all assumptions and stress limit criteria for approval. The design shall be based on loads, stresses and design codes and standards specified herein. The stack shall be designed for all conditions and loads to which it may be subjected from flue gas, temperature variations, corrosion, wind, vibration effects and boundary conditions.
  - .2 Arrangement and outline dimension drawings for approval showing weights, anchor details, materials of construction, plate thickness, lifting lugs, foundation design loads, weld requirements, field splice details, fabrication tolerances and interface connections including the inlet. Drawings shall also include the following:
    - .1 Reinforcement at all openings
    - .2 Brace detail
    - .3 Means of vibration control
    - .4 Testing requirements
    - .5 Stack dimensions including diameters, section lengths and weights
    - .6 Requirements for joining the sections in the field shall be fully specified and detailed.
  - .3 Catalog data sheets on all components.
- .2 Operation and Maintenance Data: provide for incorporation in O&M Manual as specified in Section 01735. Include complete description of operation together with general arrangement and detailed drawings, wiring diagrams for power and control schematics, parts catalogue with complete list of repair and replacement parts with section drawings illustrating the connections and identifying numbers.

#### **1.3 Coordination**

- .1 Coordinate with other Divisions to ensure there are no conflicts in the Work.

## AIR DISPERSION STACK

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### 1.4 Shipment, Protection, and Storage

- .1 Ship pre-assembled to the degree possible. Design stack in the minimum number of sections for field erection.
- .2 Provide storage instructions indicating specific requirements to ensure there is no uneven wear, distortion or weathering of components.

### 1.5 Standards

- .1 American Institute of Steel Construction (AISC): Manual of Steel Construction
- .2 National Building Code of Canada
- .3 American Welding Society (AWS): Structural Welding Code-Steel D1.1
- .4 American Society of Mechanical Engineers (ASME): STS-1-2000 Steel Stack Standard
- .5 Occupational Safety and Health Administration (OSHA): OSHA Safety and Health Standards (29 CFR 1910)
- .6 National Fire Protection Association (NFPA): Lightning Protection Code
- .7 International Committee on Chimney Design, CICIND
- .8 American Society of Civil Engineers (ASCE): ASCE 7-93 Minimum Design Loads for Buildings and Other Structures
- .9 American Society of Testing Materials (ASTM)
  - .1 A36 - Specification for Structural Steel
  - .2 A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - .3 A242 -Standard Specification for High-Strength Low-Alloy Structural Steel
  - .4 A588 -Standard Specification for High-Strength Low Alloy Structural Steel
  - .5 A-240 -Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Alloy

## 2. PRODUCTS

### 2.1 Description

- .1 The stack is required to disperse the exhaust air from the sequencing batch reactors and equalization tank.

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### 2.2 Design Criteria

- .1 The stack shall be a dual wall design to minimize temperature loss in the flue gas. The outer shell will be the structural component and the inner shell will be designed to convey the flue gas. The inner shell shall also be designed to withstand its self-weight and deflection in the outer shell.
- .2 Design stack for continuous and cyclic operation.
- .3 Provide stack with opening reinforcement and ovaling stiffeners. All openings shall be suitably reinforced to satisfy the strength, deflection and dynamic requirements of the stack design. Stiffeners shall be of the same material as the stack walls.
- .4 In determining design stress levels of the stack, consider the maximum allowable stress at the design temperature.
- .5 Clearly identify stack natural frequencies and associated critical wind velocity. If the value falls within an unacceptable range, then the stack must be designed with sufficient measures to ensure predictable dynamic control.
- .6 Design stack to limit vibrations due to vortex shedding to less than 40 percent of the stack diameter. Vibrations shall be considered in both the first and second modes of vibration.
- .7 Identify the structural damping coefficient and its basis in fact. Foundation pads will not be an acceptable means of increasing structural damping.
- .8 Design the stack in accordance with ASME STS-1 Steel Stack Standard.
- .9 Height above grade (top of concrete foundation pad): 45.7 m (150 ft 0 inch)
- .10 Ambient temperature:
  - .1 Minimum: -35°C
  - .2 Maximum: 35°C
- .11 Type of flue gas: exhaust air from treatment of wastewater; contains water vapour and some odorous/corrosive compounds, such as hydrogen sulphide and ammonia.
- .12 Flue gas flow:
  - .1 Minimum: 12,000 m<sup>3</sup>/hr
  - .2 Maximum: 31,000 m<sup>3</sup>/hr
- .13 Flue gas temperature: 5 to 25°C.

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- .14 Shell outer diameter:
  - .1 Top: 1.07 m (3 ft 6 inch)
  - .2 Bottom: 1.93 m (6 ft 4 inch)
- .15 Shell inner diameter:
  - .1 Top: 0.76 m (2 ft 6 inch)
  - .2 Bottom: 0.76 m (2 ft 4 inch)
- .16 Design wind load: NBC Canada.
- .17 Seismic zone: 0
- .18 Inlet pipe diameter: 900 mm (36 inch)
- .19 Elevation of inlet pipe: refer to Drawings
- .20 Stack design shall be sealed by a Professional Engineer registered in Canada or the United States.

#### **2.3 Acceptable Products**

- .1 Warren Environment Inc, Atlanta GA USA

#### **2.4 Materials**

- .1 Outer shell: 304L stainless steel of minimum 4.76 mm (3/16 inch) thickness
- .2 Inner shell: fibre reinforced plastic Hetron 992 FR vinylester resin of minimum 9.5 mm (3/8 inch) thickness. Corrosion allowance 3 mm (120 mil) "C" Veil.
- .3 Insulation: Minimum 50 mm (2 inch) Owens Corning TIW secured with pin studs on minimum 450 mm (18 inch) centres and wrapped with 25 mm (1 inch) galvanized "chicken" wire to prevent damage during flue installation. Insulation to be located in the annulus between the two shells.

#### **2.5 Accessories**

- .1 Provide:
  - .1 Anchor bolts
  - .2 Breeching opening
  - .3 Access door at base



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- .4 Top cap
- .5 False bottom with drain
- .6 Tuned mass damper for vibration isolation
- .7 Thompson Model 666E lightning terminal with suitable base to allow mounting on the top of the stack. Provide three lightning cables to reach the ground rods at the base of the stack.
- .8 Lightning grounding lugs at base per NFPA requirements

### **3. EXECUTION**

#### **3.1 Manufacturer's Representative**

- .1 To ensure the equipment is installed, operated, and maintained in accordance with the manufacturer's recommended procedures, arrange for a technically qualified manufacturer's representative to witness the installation Work, certify correct installation, train operating and maintenance staff, and undertake system testing.

#### **3.2 Fabrication**

- .1 Fabricate and assemble structural assemblies in the shop wherever possible. Fabricate in accordance with AISC Specifications, ASME STS-1-2000 Steel Stack Standard, and approved Shop Drawings.
- .2 All welding procedures and welder qualifications shall be in accordance with AWS D1.1 or ASME Section IX. If requested, procedure certification reports and welder qualifications shall be submitted to the Contract Administrator for review.
- .3 All butt welds shall be two sided unless diameter prevents access. Welds shall be back-gouged to sound metal before welding the second side. Welding procedure certifications and welder qualification reports shall be made available to the Contract Administrator if requested.
- .4 Properly match mark materials for field assembly.

#### **3.3 Installation**

- .1 Ensure the equipment is installed as required to provide satisfactory service.
- .2 Instruct installer in the methods and precautions to be followed in the installation of the equipment. Certify the installer's understanding by completing Form 101, included in Section 01650.
- .3 Cooperate with the installer to fulfill the requirements for a successful installation by completing Form 102, included in Section 01650.

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**3.4 Testing**

- .1 Ensure the equipment, including all component parts, operates as intended.
- .2 Cooperate with the installer to fulfill the requirements for successful testing of the equipment by completing Form 103, included in Section 01650.

**END OF SECTION**